

**BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554**

In the Matter of

Revision of the Commission's Rules
To Ensure Compatibility with Enhanced 911
Emergency Calling Systems

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CC Docket No. 94-102

ACS WIRELESS PETITION FOR LIMITED WAIVER

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EXECUTIVE SUMMARY

ACS Wireless, Inc. (“ACSW”) requests a limited Waiver of the E911 Phase II Location Technology Implementation Rules of the Federal Communications Commission (“Commission”) set forth in 47 C.F.R. § 20.18(e)-(h) (“Phase II rules”). ACSW is a small regional wireless carrier that serves Alaska. ACSW operates over a Time Division Multiple Access (“TDMA”) and Advanced Mobile Phone Service (“AMPS”) network that has been designed and constructed to address Alaska’s overall demographic, climatic, and geographic obstacles.

In particular, Alaska’s population is generally very spread out across large distances in the state. In many cases, cell sites are deployed in an atypical network design (largely non-matrix). For example, towers are aligned along highways, like pearls on a string, or are located on mountaintops or in other extremely rural and remote locations. Consequently, ACSW cannot effectively use location solutions that rely on triangulation or signal strength measurements to provide location services across its network, without substantial and costly network modifications. It has been extraordinarily difficult for ACSW to identify a technically feasible, network-wide reliable and proven location solution. In fact, no single location solution available to date will provide ACSW subscribers with location services in line with the Commission’s accuracy standards.

ACSW is the owner of three PCS licenses and plans to complete its initial build-out of this network by April 28, 2002, as required by the Commission’s build-out rules. ACSW has selected Code Division Multiple Access technology (“CDMA”) for this network because this technology has significant advantages for ACSW subscribers.

Among these advantages are high speed Internet access and accurate location services. ACSW can meet the Commission's accuracy standards using Assisted Global Positioning Satellite ("A-GPS") technology on its soon to be deployed CDMA network. Based on ACSW's investigation of the available alternatives, A-GPS is the most accurate and feasible location solution for its Alaska network.

In light of the fact that ACSW's CDMS network will not be initially deployed until April 28, 2002, ACSW proposes a compliance plan as follows:

- Provide TDMA and AMPS customers Phase I location services within 6 months of a PSAP request;
- As of April 28, 2002, ensure that 100% of all handsets activated on its CDMA network are A-GPS capable;
- By April 1, 2003 or within 6 months of a PSAP request, whichever is later, begin delivering Phase II enhanced 911 service to the PSAP on its CDMA network from its Anchorage switch;
- By December 31, 2003, replace 40% of the handsets in its TDMA/AMPS network with A-GPS-enabled handsets;
- By April 1, 2004 or within 6 months of a PSAP request, whichever is later, begin delivering Phase II enhanced 911 service to the PSAP on its CDMA network from its Juneau and Fairbanks switches;
- By December 31, 2005, undertake reasonable efforts to achieve 55% penetration of location capable handsets among its digital subscribers; and
- By December 31, 2007, undertake reasonable efforts to achieve 95% penetration of location capable handsets among its digital subscribers.

The foregoing plan will ensure that ACSW customers receive the benefit of Phase II E911 location accuracy over a time frame that permits the most appropriate deployment of that service over ACSW's Alaska network. ACSW has conferred with the largest PSAPs in the State of Alaska, including the Anchorage (the APCO Project 38 Model City) PSAP, regarding its plan. The PSAPs concur with ACSW's plan. Accordingly, special circumstances exist to justify a limited waiver of the Phase II rules for ACSW and such waiver is in the public interest.

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ACS WIRELESS PETITION FOR LIMITED WAIVER

ACS Wireless, Inc. (“ACSW”), pursuant to 47 C.F.R § 1.3 and § 1.925 hereby requests a limited Waiver of the E911 Phase II Location Technology Implementation Rules of the Federal Communications Commission (“Commission”) set forth in 47 C.F.R. § 20.18(e)-(h) (“Phase II rules”). ACSW is a small regional wireless carrier serving Alaska and currently provides wireless telecommunications over a Time Division Multiple Access (“TDMA”) and Advanced Mobile Phone Service (“AMPS”) network. ACSW has diligently investigated different location solutions for this network. However, the extreme rural and remote locations of a significant portion of its cell sites make developing a reliable and proven location solution network-wide for the TDMA and AMPS networks extraordinarily difficult. The available solutions are not usable network-wide in a technically feasible manner because of Alaska’s overall demographic, climatic, and geographic obstacles.

ACSW can meet the Commission’s accuracy standards using Assisted Global Positioning Satellite (“A-GPS”) on its soon to be deployed Code Division Multiple Access (“CDMA”) network. A new CDMA network has significant advantages for consumers. Among these advantages are high-speed wireless Internet access as well as accurate Phase II location services.

Based on ACSW’s investigation, an A-GPS handset-based solution for this CDMA network is the best and most feasible alternative for its Alaska network. ACSW seeks permission to deploy the Phase II location services through its new CDMA network and to phase in this solution over a slightly longer period of time than originally mandated. ACSW will use reasonable efforts to transition as many TDMA-AMPS

customers as possible to this network, and plans to replace 40% of all handsets on this network with A-GPS enabled handsets by December 31, 2003. All handsets activated on its CDMA network will be A-GPS-capable. ACSW provides herein its blueprint for implementing Phase II service as closely as possible to the Commission's rules, as well as a compliance plan.

ACSW has conferred with the largest PSAPs in the State of Alaska, including the Anchorage (the APCO Project 38 Model City) PSAP, regarding its plan. The PSAPs concur with ACSW's plan.¹ For the reasons set forth below, the Commission should grant ACSW a limited waiver of its Phase II rules.

I. STANDARD FOR GRANTING WAIVER

Under the Communications Act, the Commission must promote the safety of life and property through the use of wire and radio communications.² This mandate has been enhanced by the enactment of the Wireless Communications and Public Safety Act of 1999.³ The purpose of the 911 Act is to enhance public safety by encouraging and facilitating the prompt deployment of a nationwide, seamless communications infrastructure for emergency services that includes wireless communications.⁴ In furtherance of this mandate, the Commission promulgated rules for the phase-in of E911 location technologies as well as standards for the accuracy and reliability of such technologies.⁵

¹ No PSAP has made a request for Phase I or Phase II accuracy in Alaska at this time.

² See Section 1 of the Communications Act, 47 U.S.C. § 151.

³ Wireless Communications and Public Safety Act of 1999, Pub. L. No. 106-81, enacted Oct. 26, 1999 ("911 Act").

⁴ *Id.*

⁵ See 47 C.F.R. § 20.18 *et seq.*

The Commission has recognized that, in certain circumstances, for instance where technology-related issues or other exceptional circumstances arise, the Commission may waive its rules.⁶ Generally, the Commission's rules may be waived for good cause shown.⁷ Further, waiver is appropriate if special circumstances warrant a deviation from the rules, and such a deviation will serve the public interest.⁸ Special circumstances include unusual factual circumstances that make application of the rule(s) inequitable or unduly burdensome, or when an applicant for waiver has no reasonable alternative to enable compliance with the rule(s).⁹

In the context of the E911 initiative, the Commission has implicitly recognized that rural or smaller carriers may have difficulty deploying location technologies.¹⁰ The Commission noted that the cost of upgrades, combined with the relatively low number and density of customers in rural areas, could impose high per customer costs in rural areas.¹¹ Further, in selecting a location solution, accuracy is only one of several important means by which location technologies contribute to the public safety.¹² The rate and extent of deployment, reliability, encouragement of further improvements, and cost are other relevant factors to consider.¹³

⁶ See *Fourth Memorandum Opinion and Order*, ¶ 43.

⁷ *Id.*; see also 47 C.F.R. § 1.3.

⁸ *Id.*

⁹ See 47 C.F.R. § 1.925(b)(3)(ii).

¹⁰ See generally TRO ¶ 23.

¹¹ TRO ¶ 23.

¹² See *Fourth Memorandum Opinion and Order*, ¶ 40.

¹³ *Id.*

All of these considerations support granting ACSW a limited waiver of the Phase II rules. ACSW establishes herein that special circumstances exist to justify a limited waiver of the location accuracy requirements to allow ACSW to delay deployment of a Phase II location solution until it can offer an A-GPS solution on its planned CDMA network. Moreover, ACSW establishes that this waiver is in the public interest.¹⁴

II. ACSW'S NETWORK

ACSW is a small regional carrier that provides wireless service over a TDMA and AMPS network. Operating across Alaska, ACSW currently serves 78,574 cellular subscribers out of a total state population of approximately 622,000, achieving a penetration rate of 17%. It offers a vast in-state service calling area with coverage in Alaska's few most densely populated cities and numerous smaller communities. ACSW's network extends from Ketchikan in the Southeast to Barrow and Deadhorse on the North Slope and to Homer in Southcentral, an area of approximately 325,000 square miles.¹⁵ Thus, the ACSW network spans an enormous area encompassing coastal areas, mountain ranges, rainforest, glaciers, and tundra, all with different climates, geography and demographics. Further, the state is very sparsely settled with small villages and communities spread often many hundreds of miles apart, which are, in many cases, inaccessible by road.

¹⁴ See generally AT&T Petition for Waiver and *In the Matter of Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, *Fourth Memorandum Opinion and Order*, 15 FCC Rcd. 17442 (2000) ¶ 43 (citing Northeast Cellular Telephone Co. v. FCC, 897 F.2d 1164, 1166 (D.C. Cir. 1990)) (other citations omitted).

¹⁵ ACSW's service is not continuously available throughout this entire area.

ACSW has three principal service areas in Alaska centered around its three switches. These markets are Anchorage (Southcentral), Fairbanks (North), and Juneau (Southeast). The network configuration in each of these three markets differs significantly. Each presents unique challenges, which complicate deployment of a fully compliant, accurate location solution within the Phase II rules' time frames.

Anchorage (Southcentral)¹⁶

The Anchorage market includes Anchorage, Alaska's only "large" city with a population of 260,283,¹⁷ and other smaller communities, including Homer (pop. 3946), Glenallen (pop. 554),¹⁸ Whittier (pop. 182), Soldotna (pop. 3759), and Clam Gulch (pop. 173). There are 54 sites in this area, which cover a population of 309,974 and serve 56,709 subscribers. The 20 sites in Anchorage proper mirror the typical matrix or star-type network configuration found in urban areas in the Lower 48. However, Anchorage is ACSW's only location in this service area (and the state) in which this optimum configuration is found.

Due to the distance and terrain of this market, most of the 54 sites do not hand off to other sites. As a rule, only one highway runs in and out of the communities in Alaska and the cell sites are located along that one road like "pearls on a string." For example, on the Kenai Peninsula south of Anchorage, 20 cell sites cover 173 miles of road and are configured in a linear fashion. Even in the Anchorage area, 4 cell sites are located in a

¹⁶ See Exhibit A, Map of Anchorage Metro Area Cellular Sites and Map of Kenai Peninsula (Anchorage Market) Cellular Sites.

¹⁷ All population statistics contained in this pleading are derived from the 2000 Census.

¹⁸ Glenallen is considered a "suburb" of Anchorage, although it is located 134 miles from that city.

linear configuration along the highway going north out of the city, covering 27 miles of road.

Fairbanks (North)¹⁹

The Fairbanks market includes Fairbanks (pop. 30,224), as well as outlying areas such as North Pole (pop. 1570), Nenana (pop. 402), Delta Junction (pop. 840), Harding Lake (pop. 216), McKinley (pop. 142), Barrow (pop. 4581), and Tok (pop. 1393), among others.²⁰ The market stretches to extremely isolated areas, like Deadhorse, which is over 489 miles from the center of Fairbanks and above the Arctic Circle on Prudhoe Bay. This area of Alaska experiences some of the most extreme weather conditions in the state. Generally, winter begins in late August and lasts until late May. Frozen tundra, mountain ranges, and vast roadless expanses characterize this Northern region.

There are 22 sites in this market that serve 17,138 subscribers out of a market-wide population of 90,225. Only in Fairbanks proper will a subscriber's handset be able to see three cell sites. Twenty cell sites cover 440 miles of road, configured in a linear fashion. Only six of the total twenty-two sites in this market are capable of handing signals off to other cell sites.

Juneau (Southeast)²¹

The Juneau market includes Juneau, the third largest city in Alaska (pop. 30,711), Sitka (pop. 8835), Ketchikan (pop. 7922), and many small villages, including Klawock

¹⁹ See Exhibit B, Map of Fairbanks Market Outlying Cellular Sites and Map of North Slope (Fairbanks Market) Cellular Sites.

²⁰ ACSW's one analog cell site is located in Barrow. Approximately 30% of ACSW's users have analog handsets, however, even though ACSW provides digital service in all other locations.

²¹ See Exhibit C, Map of Southeast Alaska (Juneau) Market Outlying Cellular Sites.

(pop. 854), Thorne Bay (pop. 557), Craig (pop. 1397), and Manley (pop. 72). There are 22 sites in this market, which cover a population of 53,616 and serve 5,492 subscribers. Southeast Alaska is a northern temperate rainforest. Steep mountains rising straight from the sea, plentiful rain and humidity many months of the year, fjords, and dense forests characterize this region of the state.

In Juneau, which is located narrowly between several heavily forested mountains, there is no place where a subscriber's handset can see more than two cell sites. In Ketchikan, only two cell sites hand off to one another. All of the 18 other sites in this market are on mountaintops and do not hand off to other cell sites.

In sum, of the foregoing 98 cell sites in ACSW's TDMA network, *only 54 cell sites can hand off to two or more cell sites*. Therefore, only 54 cell sites are situated appropriately for most, if not all, network based location technologies to work properly.²² *The remaining 44 sites, or over 45% of ACSW's network*, are extremely problematic for network-based location technologies. Eight of the 44 cell sites are on highways and while a handset is able to see two other cell sites when using these cell sites, it can only see them in a straight line. So, because they cannot triangulate, a subscriber's handset sees, in effect, only one cell site. For sixteen of the 44 cell sites, a subscriber's handset can see only a single other cell site.²³ Lastly, twenty of the 44 sites are stand-alone sites and cannot hand off to any other cell sites.²⁴

²² Most of ACSW's mobile traffic is in these 54 sites.

²³ Of these 16 sites, some are used for fixed dial tone.

²⁴ These sites include, but are not limited to, Bedami, Barrow, Seward, Ratz Mountain, Tern Lake, Whittier, Moose Pass, Nenana, Healy and McKinley. Some of the 20 stand-alone sites are used for fixed wireless to provide basic dial tone to rural customers. In these instances, local PSAPs are aware of the mobile unit's address because the unit is not truly mobile.

To further complicate matters, ACSW owns less than one-half of its cell towers. ACSW leases most of its towers from another telecommunications carrier. Due to the expense of constructing and maintaining towers in remote areas of Alaska, a single tower is often used to support long-distance, microwave and cellular services. Consequently, a substantial number of these towers are already overloaded. To date, ACSW has had to wait more than one year to get access to certain towers to install additional antennae and other equipment. Therefore, ACSW has no right to install additional equipment on a large number of its cell towers, and, even if it did, its ability to access towers in a timely or cost effective manner is diminished.

The foregoing describes the unique configuration of ACSW's TDMA network. In addition, ACSW holds three PCS licenses. Each of these licenses covers a basic trading area, which, when combined, cover the entire state of Alaska. ACSW's five-year build out date for these three licenses is April 28, 2002. ACSW is planning to deploy a CDMA-based network in its licensed frequencies in order to provide Alaskan consumers improved advanced wireless services, particularly mobile data services. ACSW intends to use reasonable efforts to migrate its existing TDMA customers to this advanced system by 2007.²⁵

III. THE COMMISSION'S PHASE II RULES

The Commission's Phase II rules set forth different standards for accuracy based on the type of location technology used. For network-based location technologies, a carrier must: 1) provide E911 service to at least 50 percent of the coverage area or 50

²⁵ In some areas, ACSW may, depending on future determinations of cost, need, or feasibility, retain some TDMA and/or analog service for its subscribers. ACSW will

percent of the population beginning October 1, 2001 or within six months of a PSAP request (whichever is later); and 2) provide E911 service to 100 percent of the coverage area or 100 percent of the population within 18 months of such a request or by October 1, 2002 (whichever is later).²⁶ Carriers must provide location information within 100 meters for 67% of calls and within 300 meters for 95% of calls.²⁷

The Phase II rules for handset-based location technologies are more stringent. Carriers employing handset technologies must: 1) begin selling and activating location-capable handsets no later than March 1, 2001; and 2) ensure that at least 50 percent of all new digital handsets activated are location-capable no later than October 1, 2002 regardless of whether a PSAP request has been made.²⁸ Once a PSAP request is made, within six months of the request or by October 1, 2001 (whichever is later), a carrier must: 1) ensure that 100 percent of all new handsets activated are location-capable; 2) install any hardware and/or software in the CMRS network and/or other fixed infrastructure, as needed, to enable the provision of E911 service; and 3) begin delivering E911 service to the PSAP. Within two years of the PSAP request or by December 31, 2004 (whichever is later), the carrier must undertake reasonable efforts to achieve 100 percent penetration of location-capable handsets among its subscribers.²⁹ Carriers must also provide location information within 50 meters for 67% of calls and within 150

maintain analog service to the extent required by the Commission's rules and its subscribers needs.

²⁶ 47 C.F.R. § 20.18(f).

²⁷ For the remaining 5% of calls, location attempts must be made and a location estimate must be provided to the PSAP. 47 C.F.R. § 20.18(h)(3).

²⁸ 47 C.F.R. § 20.18(g)(4).

²⁹ 47 C.F.R. § 20.18(g)(2).

meters for 95% of calls.³⁰ In light of these standards, ACSW investigated both network-based and hand-set based location solutions.

IV. ACSW INVESTIGATED MULTIPLE NETWORK-BASED LOCATION SOLUTIONS FOR ITS TDMA NETWORK AND NO ONE SOLUTION MEETS THE PHASE II ACCURACY STANDARD

ACSW's options for an accurate network-based location technology are limited by the fact that it operates a largely TDMA-based network in a rural area. It is widely accepted that, for TDMA networks, the most accurate available network-based location solutions are Time Difference of Arrival ("TDOA"), Angle of Arrival ("AOA"), and Mobile-Assisted Network Locations System using a mobile-assisted hand off technique (generally referred to as "MNLS") or other similar solution, which relies on triangulation and/or interpretation of signal strength measurements.³¹ However, industry tests have revealed that none of these network solutions can strictly meet the Commission's accuracy requirements, particularly for TDMA networks.³² ACSW's own analysis supports this conclusion.

Moreover, because of the unique characteristics of ACSW's network, no *single* location solution will provide location accuracy levels that comply with the

³⁰ As with network-based solutions, for the remaining 5% of calls, location attempts must be made and a location estimate must be provided to the PSAP. 47 C.F.R. § 20.18(h)(3).

³¹ TDOA, AOA and Sensors all rely on triangulation in order to determine the location of a mobile unit. MNLS uses an existing mechanism of the handset combined with a technique known as mobile-assisted handoff (MAHO) to make and transmit measurements that are compared against a database of signal measurements to determine the location of a mobile unit.

³² See Cingular Waiver Petition at 23, 32-33, wherein Cingular discusses the analyses and findings of various industry representatives including VoiceStream, AT&T, Motorola, Ericsson and Nokia.

Commission's mandate. To meet the Commission's accuracy standards, ACSW would have to deploy combinations of technologies across its network in ways that are unproven and with unknown reliability. For example, ACSW would have to construct a parallel subnetwork for all sites that can see only one other site, designed solely to allow these location solutions to function as designed. Deploying even one of these technologies, let alone several, in Alaska, is prohibitively expensive for ACSW and its small customer base. Bottom line, it does not make sense to invest such large sums of money to create extraordinary solutions when it is not even clear that the solutions will reliably achieve Phase II accuracy levels. ACSW's investigations of various technologies revealed the following:

TDOA (54 sites)

The problems with TDOA are threefold. First, TDOA alone is an option for only 54 of the 98 sites in ACSW's network. These 54 sites are not in the same market, rather the 54 sites are found in the most "urban" markets of the state like Anchorage, Fairbanks and Juneau, proper. Therefore, ACSW is faced with deploying this technology across three distinct areas, with full function only in those areas with the most concentrated cell deployment where signal triangulation is possible.

Second, field trials reveal that TDOA technology is not particularly accurate. AT&T's trials revealed that TruePosition's TDOA technology could only provide accuracy within 318-371 meters for 67% of calls and within 965-1226 meters for 95% of all drive-test calls.³³ Similarly, Grayson's TDOA technology provided substandard accuracy results or within 245-855 meters for 67% of calls and within 474-1624 meters

³³ See AT&T Waiver Petition at 8.

for 95% of all drive-test calls.³⁴ Thus, data from field tests conducted in much more ideal circumstances than those present in Alaska (*i.e.* in a clustered network) reveals that TDOA alone is not compliant with the Commission's Phase II rules.

Third, this technology is very expensive to deploy in Alaska, particularly in light of the fact that TDOA is only a partial solution for ACSW's network (only 54 sites), as discussed more fully below. Its vendor has advised ACSW that the approximate cost of the basic equipment necessary to run this solution is \$25,000-30,000 per cell site, and this is just the beginning.³⁵ This cost does not include installation expenses (discussed in detail below), or the inherent administrative and computer costs of backhauling location information from the tower to one of ACSW's three switches. All location information from the responding cell site must be backhauled to the switch, where a processor compares the information to determine location. Transporting the information back to the switch, or backhauling, can be a costly endeavor because many cell sites are a great distance from any one of ACSW's three switches.

Based on these additional and unavoidable expenses, the cost to ACSW for TDOA is likely to greatly exceed the estimated raw equipment cost of \$25,000-30,000 for each site. And, this cost calculation only applies to 54 sites. For the remaining 44 sites in ACSW's network, ACSW would have to deploy additional location solutions.

TDOA + AOA (24 sites)

Because TDOA alone is not fully compliant with the Commission's Phase II rules and is only functional in little more than one-half of ACSW's network, ACSW explored

³⁴ *Id.* at. 9.

³⁵ ACSW received an equipment quote from Grayson Wireless.

using TDOA in combination with other technologies. Specifically, ACSW investigated using AOA in conjunction with TDOA. Although this combination provides broader location coverage across ACSW's network, even a combination of the two technologies will not provide Phase II levels of accuracy. As AT&T found in its trials, TDOA and AOA together only provide accuracy levels of within 250-400 meters for 67% and 420-750 meters for 95% of all drive-test calls.³⁶ Moreover, even TDOA and AOA combined would only provide improved accuracy for an additional 24 cell sites and not for all of ACSW's network.

Further, like TDOA, AOA requires new equipment. Generally, AOA requires an array of antennae deployed on a single tower to ensure proper signal direction can be determined. Identifying and securing tower space for this equipment is essential. But, in some instances, due to existing tower over capacity, new towers would have to be constructed. The construction of even one new tower is a significant undertaking. Generally, a single tower can cost in excess of \$100,000.

With installation costs factored in, the cost of a new tower can exceed \$150,000. This is because installation costs in Alaska can be extraordinarily high and are often unpredictable.³⁷ Extreme weather conditions in many areas of the State mean that network construction may only be completed within a small window of time. For example, on the North Slope, construction can only occur 2 or 3 months of the year. In Southcentral Alaska, the construction season is slightly longer (generally May to September) though appreciably shorter than is typical in the lower 48 states. Deployment

³⁶ AT&T Waiver at 9.

³⁷ These costs apply to any construction endeavor in Alaska, not just towers.

must be scheduled during limited construction periods along with all of ACSW's other construction and maintenance priorities. Therefore, rapid deployment of any technology is hindered by factors outside of ACSW's control.

Further, there are a number of complex engineering issues to consider. Certain precautions and special steps often need to be taken in areas that experience extreme temperature fluctuations or varying levels of rain or snowfall.³⁸ For example, equipment refinements or the addition of special casings often need to be added to "weatherize" equipment to ensure signal strength, connector quality, and service reliability. Similarly, the changing weight loads that equipment and towers can withstand factor into nearly every modification to towers in Alaska, more so than in other climates. Ice and wind conditions can dramatically affect the stability of a tower. For example, in areas of heavy icing, the build up of ice on equipment in the winter must be addressed because ice changes the weight as well as the surface area of equipment, which alters its relationship to the tower (*e.g.*, weight as well as wind resistance). Therefore, evaluating and remedying these engineering considerations becomes critical in Alaska.

³⁸ Extreme seasonal temperature differences of -78 degrees in the winter to 98 degrees in the summer have been recorded for Northern areas such as Fairbanks, North Pole and Nenana. The climate of Barrow is arctic, where the daily minimum temperature is below freezing 324 days of the year. In Southcentral Alaska, the temperatures range from -10 degrees in the winter to 70 degrees in the summer for areas such as Anchorage, Homer, Whittier and Clam Gulch. In Glenallen, temperature ranges from as low as -74 to as high as 96 have been recorded. Southeast Alaska is noted for its heavy precipitation. In areas such as Juneau, Sitka, Ketchikan, Craig and Thorne Bay, precipitation ranges from 92 to 162 inches, including snowfall amounts of as much as 101 inches annually. Alaska Department of Community and Economic Development.

Lastly, due to the remoteness of numerous towers (one-fourth of ACSW's cities are not located on a road), ACSW must use other transportation means to access these sites. In most cases, ACSW must hire a helicopter to access these towers, which is an expense in excess of \$1,200/per hour for flight time and two technicians. Barrow, for example, as well as other sites are three or more hours away by helicopter. All of these unique and unusual circumstances greatly increase the expense of deploying already expensive location technologies.

TDOA + AOA + Sensor (20 sites)

To address a location solution for the remaining 20 cell sites in its network, ACSW explored deploying TDOA and AOA with a stand alone, intermediate Sensor. A Sensor is necessary to assist in transporting a signal from the transmitting cell site to the nearest switch. While this approach would provide location coverage to ACSW's entire network, its accuracy would always be limited by the inherent inaccuracy of TDOA and AOA. In addition, accuracy is compromised by an inability to maintain the integrity of Sensor equipment in remote areas.

As with TDOA and AOA, there are significant equipment costs with Sensors. More importantly, however, Sensors will likely require their own towers. Again, ACSW would have to construct a subnetwork of towers around each remote base station. Each tower would hold the Sensor and microwave equipment capable of transmitting the time difference of arrival information back to the switch.

In addition, the maintenance costs of Sensors, in particular, are likely to be unsustainable. Each Sensor will need an independent power source to function properly. There are no electric utility or other power sources in the remote areas where Sensors are

necessary. Accordingly, each Sensor would need to be deployed with two generators. The existence of generators creates significant operational problems, which include the difficulty of ensuring a constant supply of fuel, and the inability to provide year round monitoring and maintenance of the Sensor. Further, at each site, ACSW would have to install batteries, a solar panel array, and potentially a wind turbine, all surrounded by an electric fence to keep bears and moose from damaging the equipment.

These issues substantially magnify the cost of this solution, particularly since stand-alone remote site may serve only 50-100 people. Further, they fatally compromise the functioning and reliability of the equipment. All told, ACSW will not be able to ensure the accuracy of the location solution, because the accuracy quality is only as good as the equipment needed to sustain it.

MNLS³⁹

Another alternative that ACSW explored is MNLS. While MNLS is the only network-based solution that could be deployed throughout ACSW's network on its own, MNLS is not a viable option either. MNLS will not function properly or provide Phase II accuracy levels across ACSW's network.

Only in the 54 cell sites, in which three signal measurements can be obtained, will MNLS provide Phase II location information. That location information, however, will not be in line with the Commission's accuracy mandate. As AT&T's trials revealed, MNLS only provides location accuracy levels of within 250 meters 67% of the time and

³⁹ Here, MNLS refers to a Mobile Assisted Network Locations System using a Mobile Assisted Handoff Technique.

within 750 meters 95% of the time and only in *urban* settings.⁴⁰ The comparatively highly urban networks tested do not have parallel configurations to ACSW's largely more rural network configuration. Therefore, for the 54 cell sites noted above, the accuracy levels achieved in AT&T's trials will likely be difficult to replicate.

Moreover, with MNLS, close to one-half of ACSW's network will not realize Phase II location information. For 44 cell sites, MNLS will only give Phase I location accuracy, *i.e.* the phone number of the mobile unit and from which site the call originates.⁴¹ For these cell sites, MNLS cannot provide any estimate of how far the mobile unit is from the tower or its specific direction.⁴² Thus, MNLS is of very limited use for nearly half of ACSW's network. As with other solutions, to provide Phase II service to its full network, ACSW would have to supplement this technology.

Further, like the other network-based technologies analyzed, the costs of MNLS are prohibitive. Although there are no external equipment upgrades needed for MNLS (*i.e.* no antennae or tower modifications are needed), the software for MNLS is very expensive. ACSW has received a quote from its vendor for MNLS in the range of \$2.5 million. As with the cost of TDOA, AOA and Sensors, the cost of MNLS represents a large portion of ACSW's network-wide annual capital budget.

The foregoing analyses demonstrate that, in order to provide location coverage across its network (although still not compliant), ACSW would have to deploy multiple,

⁴⁰ See AT&T Petition for Waiver, filed April 4, 2001 at 13; Cingular Petition for Limited Waiver, filed July 6, 2001 at 21. AT&T's testing was conducted in a highly urban settings like Stockholm, Sweden, Kirkland and Redmond, Washington, at least when compared to the urban areas in Alaska.

⁴¹ See 47 C.F.R. § 20.18(d)(1).

⁴² In the few instances where multidirectional antennas are deployed, MNLS would transmit sector information to the PSAP.

different location technologies at the same time. ACSW cannot segment the deployment of these technologies by market. For example, ACSW could not elect TDOA for Southcentral and AOA for the Northern market. Rather, elements of each of these technologies would be needed in each market. Because of construction and/or operation limitations, ACSW could not deploy any of these solutions within the Commission's time frames. Thus, the deployment costs and logistical/administrative considerations of these technologies are highly complex. In addition, none of the network-based location solutions discussed above is a cost effective solution for ACSW or its small subscriber base, technically feasible, or proven reliable in real-world deployment. In light of ACSW's near term deployment of CDMA technology, a more dynamic and advanced network operating platform than TDMA, ACSW explored other location solutions.

V. ACSW'S INVESTIGATION OF HANDSET-BASED SOLUTIONS DEMONSTRATED THAT DEPLOYING A-GPS IN ITS CDMA NETWORK IS THE BEST OPTION FOR ITS ALASKA NETWORK

Given the difficulties with implementing an accurate network-based solution in its TDMA network, ACSW turned to handset-based solutions. ACS owns three PCS licenses, and has plans to deploy CDMA equipment by April 2002, in accordance with its five-year license built out requirements.⁴³ ACSW has determined that A-GPS handsets are a viable location technology option for this network. Tests of A-GPS handsets reveal that they will meet the Commission's Phase II accuracy standards.⁴⁴ Therefore, ACSW seeks to deploy A-GPS handsets in this network from the outset.

⁴³ See 47 CFR § 24.229.

⁴⁴ See SnapTrack White Paper, *Location Technologies for GSM, GPRS and WCDMA Networks*, at 15.

A-GPS is not a viable option for ACSW's TDMA network because there are no A-GPS handsets commercially available for TDMA networks and handset modifications are not available for all legacy equipment. As Cingular noted in its waiver petition, handset vendors have indicated that they will not be developing GPS solutions for TDMA handsets.⁴⁵ At present, there is no GPS-enabled TDMA handset type certified with the Commission. Even if such handsets are eventually developed, it will likely not be until after April 2002, or past the time when ACSW will have met its initial PCS license build out requirement. Further, if and when they are available, the larger carriers with TDMA networks, like AT&T and Cingular, are likely to be the first priority for manufacturers because they will place much larger equipment orders. This would leave smaller carriers, like ACSW, at the back of the line for this equipment and unable to reliably predict when equipment will be available.

As for GPS handset modifications, ACSW is aware of only one company that is offering a GPS-enabled battery. This modification is expensive and will likely cost \$150 per battery for high volume orders (*i.e.*, only greater than 10,000 units).⁴⁶ In addition, only three types of batteries will be available. Consequently, this option will not work for all the handsets in ACSW's network and it will make a single handset quite expensive. As a result, this is not a feasible option for ACSW's subscribers.

Since ACSW intends to transition its TDMA customers to the more advanced PCS network, it makes more sense to focus deployment efforts on this newer, more

⁴⁵ See Cingular petition at 33 citing Nokia, Motorola and Panasonic.

⁴⁶ The company is Airbiquity.

advanced system.⁴⁷ This is true from both an economic perspective, which impacts ACSW and its customer base, as well as from a wide range of technical considerations. Consequently, ACSW proposes to deploy A-GPS in its planned CDMA network only. An A-GPS solution, deployed over its new CDMA network, will provide Alaskans the best overall location solution – it will allow ACSW to offer Alaskans Phase II accuracy in its network, albeit over a slightly longer time from than the Commission’s rules contemplate.⁴⁸

VI. ACSW’S BLUEPRINT FOR DEPLOYMENT ACHIEVES PHASE II LOCATION ACCURACY AS CLOSELY AS POSSIBLE TO THE COMMISSION’S RULES

ACSW proposes the following compliance plan for Phase II location accuracy standards:

- Provide TDMA and AMPS customers Phase I location services within 6 months of a PSAP request;
- As of April 28, 2002, ensure that 100% of all handsets activated on its CDMA network are A-GPS capable;⁴⁹
- By April 1, 2003 or within 6 months of a PSAP request, whichever is later, begin delivering Phase II enhanced 911 service to the PSAPs on its CDMA network that utilize its Anchorage switch;

⁴⁷ As noted *supra*, to the extent necessary, ACSW may maintain a portion of its TDMA and AMPS network in order to meet the needs of its most rural and analog users.

⁴⁸ Like Sprint, ACSW does not seek relief from the Commission’s accuracy requirements. Rather, ACSW seeks to delay the deployment schedule somewhat. On October 12, 2001, the Commission granted Sprint’s request for a delayed deployment schedule. *In the Matter of Revision of the Commission’s Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, Request for Waiver by Sprint Spectrum L.P. d/b/a Sprint PCS*, CC Docket No. 94-102, *Order*, FCC 01-297 (rel. October 12, 2001).

⁴⁹ Initially, ACSW will deploy a limited number of A-GPS handsets on this network to test the system and service. Commercial availability of this system and A-GPS handsets is expected by April 1, 2003.

- By December 31, 2003, replace 40% of the handsets in its network with A-GPS-enabled handsets;
- By April 1, 2004 or within 6 months of a PSAP request, whichever is later, begin delivering Phase II enhanced 911 service to the PSAP on its CDMA network from its Juneau and Fairbanks switches;
- By December 31, 2005, undertake reasonable efforts to achieve 55% penetration of location capable handsets among its digital subscribers; and
- By December 31, 2007, undertake reasonable efforts to achieve 95% penetration of location capable handsets among its digital subscribers.⁵⁰

This plan is specific and focused and sets forth a detailed path to compliance as closely as possible with the Commission's rules. In addition, it has clear advantages for Alaskan consumers. First, A-GPS is a superior location technology than any of the other technologies explored by ACSW, particularly when deployed in a CDMA network. Second, A-GPS is a reliable solution, unlike trying to adapt network-based solutions in unproven ways within the TDMA/AMPS framework. Third, an A-GPS solution will mean lower overall costs of location services for consumers. Fourth, the advantages that deploying advanced wireless technologies will bring consumers outweigh a limited delay in the availability of location services.

⁵⁰ ACS may retain a limited amount of TDMA equipment, for which there is no handset-based location solution available at this time, in some Bush communities to upgrade these subscribers from analog to digital service.

Accuracy

ACSW's plan will comply with the Commission's accuracy standards in its CDMA network and as many customers as possible will be transitioned to this network to achieve the widest compliance network-wide. By using A-GPS technology, ACSW will be able to comply with the Commission's Phase II rules. A-GPS technology will allow ACSW to report location information of at least within 50 meters for 67% of calls and 150 meters for 95% of calls.⁵¹ Performance studies, such as that of SnapTrack, have shown that A-GPS is highly accurate (typically within 5m-50m) and is very consistent across geographies.⁵² Consistency across terrains is very important in the highly diverse areas of ACSW's network, which include rain forests, mountainous regions, and vast expanses of tundra. A-GPS also operates more quickly than other technologies and can typically fix an initial position within 5 to 10 seconds plus network latency.⁵³ Therefore, A-GPS technology is a superior choice over the other technologies investigated for ACSW's TDMA network because it is compliant with the Commission's Phase II rules.⁵⁴

Reliability

A-GPS offers a much more reliable solution than the other location solutions investigated by ACSW. As noted above, A-GPS has been well tested and its reliability has been established by such tests. Moreover, because A-GPS is a handset-based

⁵¹ See SnapTrack White Paper, *Location technologies for GSM, GPRS and WCDMA Networks*, at 15 ("SnapTrack White Paper").

⁵² *Id.*

⁵³ SnapTrack White Paper, at 15.

⁵⁴ Sprint Waiver.

solution, it avoids the significant reliability obstacles presented by the other solutions. Its reliability is independent of ACSW's network infrastructure issues.⁵⁵

In addition, A-GPS equipment is not deployed under conditions which require special maintenance and weatherization to ensure its proper function. A-GPS provides overall good performance in most conditions.⁵⁶ As a result, operational issues with a single handset can be resolved rapidly and on a cost effective basis, and this solution eliminates infrastructure concerns.

In contrast, other solutions, like Sensors, require extraordinary measures to ensure that Alaska's harsh climate conditions and wildlife do not compromise the quality and reliability of service (*e.g.*, to ensure that connectors do not degrade rapidly). Further, if a problem does occur with this equipment, depending on the time of year, ACSW may not have the ability to remedy it in a timely fashion. Lastly, the numerous location technologies needed for a network-based solution have not been deployed or tested in combination; expectations of reliability are merely conjecture or speculation. Therefore, a solution like A-GPS, which has been proven reliable, is superior to ACSW's other location technology options.

Cost

Cost is a more major consideration for smaller carriers with smaller customer bases, than it is for the larger, nationwide carriers. Since larger carriers have higher revenues and greater financial resources, they are more able to handle the costs of expensive network or service modifications. In granting Sprint a waiver of its Phase II

⁵⁵ See SnapTrack White Paper, at 14.

⁵⁶ *Id.*

rules, the Commission expressly noted that Sprint had invested thousands of hours and tens of millions of dollars over the past year toward developing and installing a compliant Phase II technology.⁵⁷ ACSW does not have similar resources. For smaller carriers like ACSW, every capital outlay requires a high degree of strategic planning in order to minimize the impact of the outlay on the financial ability of the company and on the affordability of services for its subscribers. In the ultimate cost of a technology to subscribers, even a few dollars can make a difference to countless consumers.

While still expensive, A-GPS is the most affordable technology for Alaskan consumers. Each A-GPS handset is expected to cost approximately \$175. Many Alaskans, particularly those living in smaller and native communities, have relatively low incomes and some still rely on subsistence activities. As a result, the amount of discretionary income available for wireless services is more limited. If the cost of an A-GPS handset is spread out over time and the technology is deployed in ACSW's CDMA network only, it will be more accessible to the full range of ACSW's subscribers.

In contrast, the extraordinary costs of TDOA, AOA, Sensors, MNLS (and combinations thereof), detailed above, which cannot be spread easily over ACSW's small number of subscribers, make these technologies poor choices for Alaskan consumers. Similarly, if ACSW is required to deploy a location solution over two systems simultaneously, Alaskan consumers' access to wireless services will be negatively impacted. ACSW's limited resources will be diverted from focusing on deployment of the most accurate location solution for its network.

⁵⁷ Sprint Waiver.

ACSW proposes a longer A-GPS handset phase-in schedule in order to attempt to minimize the cost of A-GPS technology to its consumers. By extending the migration date of A-GPS handsets until 2007, the Commission would allow ACSW to phase-in the expensive A-GPS handsets over the natural life of currently deployed equipment. ACSW's calculations show that its consumers typically replace or upgrade their equipment after five years. Accordingly, ACSW's longer phase-in schedule would mirror consumers' regular trade-in cycle so that consumers would transition to a new A-GPS-enabled handset when they would normally seek to upgrade their equipment.

ACSW's A-GPS plan is appropriate for Alaska. For many Alaskans, including Native Americans, who may rely on wireless service for basic phone service, it is in the public interest to select the most cost efficient location solution and deployment schedule of the solutions available. ACSW's plan imposes reasonable cost controls while still ensuring Alaska consumers realize the benefit of location services.

Advantages to Consumers

In addition to accuracy and cost concerns, service considerations demonstrate that ACSW's implementation plan is in the public interest. At the point of initial deployment, ACSW's schedule provides that 100% of newly activated CDMA handsets will be A-GPS-enabled from the outset. The CDMA network upgrade will also bring Alaskan consumers real advantages in the form of the increased availability of advanced wireless services. Mobile data services, in particular, are extremely valuable to Alaskans. Numerous Alaskans rely on wireless services for Internet access. Deployment of CDMA technology will encourage further improvements to ACSW's data services, because this technology is more suitable for the high-speed transmission of larger volumes of data.

For example, the native community of Tyonek in Cook Inlet, which is made up of 91 households, relies on wireless service for Internet access. The present TDMA system only offers Internet access at the rate of 9.6 kbps and is circuit switched.⁵⁸ Because most websites now transmit information at much higher speeds, many websites are inaccessible to Tyonek consumers.

As part of a cooperative initiative, ACSW has committed to installing necessary CDMA equipment in Tyonek (and at other appropriate relay stations) to enable this community to realize the advanced capabilities and higher data transfer rates and web connectivity of CDMA technology. CDMA has a data transfer rate of from 9.6kbps to 144kbps. However, unlike TDMA, it is variable speed packet switched and is “always on.” Therefore, this rate and type of data transfer is preferable and more in line with modern technologies.

Not only will ACSW’s upgrade to a CDMA network allow improved data transfer rates but also it will bring other advanced wireless services. These services include wireless email, desktop applications and location-based services (*e.g.*, directions). As a result, a CDMA network, on which A-GPS will be deployed, is in the interest of Alaskan consumers because it will facilitate the more rapid availability of improved and advanced services.

VII. ALASKA’S LARGEST PSAPS ARE ENGAGED IN ACSW’S PLAN

ACSW has conferred with the largest PSAPs in the State of Alaska, including Anchorage (the APCO Project 38 Model City), Juneau, Fairbanks, Kenai, and Sitka. Together, ACSW and these PSAPs discussed the various location technologies options

⁵⁸ Consumers have to dial-up a connection and are not “always on.”

for Alaska and ACSW's network. ACSW fully advised each of these PSAPs of its planned build-out of and transition to a CDMA network and the difficulties associated with simultaneously deploying an accurate location solution in this system as well as in its TDMA system. ACSW discussed its specific A-GPS location deployment schedule with each of the PSAPs.

Each PSAP has provided a letter reflecting their position on ACSW's plan.⁵⁹

Their respective positions are as follows:

- Anchorage has no objection to ACSW's decision to implement a handset-based solution on an advanced CDMA network rather than implementing a network-based solution on a TDMA network;
- Fairbanks supports ACSW's efforts to install a phone-based E911 solution on their new advanced CDMA network;
- Kenai and Sitka stand ready to support ACSW's efforts and urges the Commission to consider ACSW's waiver request in light of ACSW's proposal; and
- Juneau is aware of ACSW's proposal and supports its efforts to provide the required Phase II location information.

Thus, each of these PSAPs is aware of ACSW's plans and is supportive of ACSW's efforts.

VIII. ACSW'S SPECIFIC REQUEST FOR RELIEF

Based on the foregoing, ACSW presents special circumstances justifying a waiver. There is good cause shown to grant ACSW a waiver of the Commission's Phase II rules so that ACSW can deploy A-GPS in its planned CDMA network and use

⁵⁹ See Exhibit D, letters in support of ACSW's Waiver Petition from: Mark Mew, Deputy Chief of the Anchorage Police Department; Timothy Biggone, Director of the Fairbanks North Star Borough Emergency Operations Department; Jim Henry, Emergency Management Coordinator of the Kenai Peninsula Borough; Bill McLendon, Chief of

reasonable efforts to transition as many TDMA/AMPS customers as possible to that network. ACSW can deploy A-GPS as quickly as and more fully than any other location solution in light of its CDMA network build-out efforts scheduled for April 2002.⁶⁰

This is a reasonable blueprint for action considering ASCW's unique circumstance. Deploying a network-based solution in ACSW's TDMA network is unreliable and technically infeasible because of its atypical network configuration and the unusual circumstances of Alaska's environment.⁶¹ The only reasonable alternative for ACSW, which serves the public interest, is to deploy an A-GPS solution over its new CDMA network and use reasonable efforts to transition other users to that platform.⁶² Accordingly, ACSW respectfully requests a limited waiver of the Commission's Phase II rules for its TDMA/AMPS network and proposes the following compliance plan:

1. Provide TDMA and AMPS customers Phase I location services within 6 months of a PSAP request;
2. As of April 28, 2002, ensure that 100% of all handsets activated on its CDMA network are A-GPS capable;⁶³
3. By April 1, 2003 or within 6 months of a PSAP request, whichever is later, begin delivering Phase II enhanced 911 service to the PSAP on its CDMA network from its Anchorage switch;
4. By December 31, 2003, replace 40% of the handsets in its TDMA/AMPS network with A-GPS-enabled handsets;

Police, City and Borough of Sitka; and Mel Personett, Chief of Police, Juneau Police Department.

⁶⁰ *Fourth Memorandum Opinion and Order* at ¶ 40.

⁶¹ 47 CFR § 1.925(b)(3)(ii).

⁶² 47 CFR § 1.925(b)(3)(ii).

⁶³ Initially, ACSW will deploy a limited number of A-GPS handsets on this network to test the system and service. Commercial availability of this system and A-GPS handsets is expected by April 1, 2003.

5. By April 1, 2004 or within 6 months of a PSAP request, whichever is later, begin delivering Phase II enhanced 911 service to the PSAP on its CDMA network from its Juneau and Fairbanks switches;
6. By December 31, 2005, undertake reasonable efforts to achieve 55% penetration of location capable handsets among its digital subscribers; and
7. By December 31, 2007, undertake reasonable efforts to achieve 95% penetration of location capable handsets among its digital subscribers.

The foregoing waiver will ensure that ACSW customers receive the benefit of Phase II E911 location accuracy over a time frame that permits the most appropriate deployment of that service over its Alaska network. ACSW's compliance plan conforms as closely as possible to the Commission's rules. For these reasons ASCW respectfully requests that the Commission grant it a limited waiver of its Phase II rules.

Respectfully submitted on this 30th day of November, 2001.

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